CLAIMS

1. A method of continuously depositing a coating on a substrate comprising

loading the substrate onto a feed spool external to a vacuum deposition chamber;

reducing the pressure in the deposition chamber to no greater than about 10^{-5} Torr;

feeding the substrate from the feed spool through the deposition chamber containing at least one deposition zone;

helically winding the substrate around a cooling block such that the substrate traverses the at least one deposition zone multiple times wherein multiple layers of a coating are applied to the substrate and for a total period of time sufficient to deposit a coating of the desired thickness onto the substrate; and

loading the coated substrate onto a take-up spool.

2. The method of claim 1 where the cooling block cools the substrate by conductive and convective cooling.

3. The method of claim 1 where there the substrate is a metal substrate and the coating is a biaxially-textured buffer layer for a high temperature superconducting material.

4. The method of claim 1 where the vacuum deposition chamber comprises one deposition zone and one coating modification zone.

5. The method of claim 1 where the length of the deposition zone is controlled by a movable shutter.

6. The method of claim 1 where the deposition chamber comprises two deposition zones and the substrate alternately traverses each deposition zone at least twice.

7. The method of claim 6 where a different coating is deposited in each deposition zone.

8. The method of claim 6 where the same coating is deposited in each deposition zone.

9. A method of continuously depositing a coating on a substrate comprising

loading the substrate onto a feed spool external to a first vacuum deposition chamber;

reducing the pressure in the first deposition chamber to no greater than about 10^{-5} Torr;

feeding the substrate from the feed spool through the first deposition chamber containing at least one deposition zone;

helically winding the substrate around a cooling block in the first deposition chamber such that the substrate traverses the at least one deposition zone multiple times wherein multiple layers of a coating are applied to the substrate and for a total period of time sufficient to deposit a coating of the desired thickness onto the substrate; and

feeding the coated tape exiting the first deposition chamber to a second deposition chamber, which is dynamically isolated from the first deposition chamber.

10. The method of claim 9 where the substrate resides in the deposition zone of the first deposition chamber for a period of time different than the time it resides in the deposition zone of the second deposition chamber.

11. The method of claim 9 where the two deposition chambers are connected via a Tee-tube.

12. The method of claim 11 where the Tee tube is between about 6 and about 12 inches long and has a diameter just sufficient to accommodate the substrate.

13. The method of claim 9 where the second deposition chamber contains a sputtering deposition zone where a coating is applied to the substrate by a sputtering process.

14. The method of claim 13 where the length of the sputtering deposition zone is controlled by a variable shutter.

15. The method of claim 13 where the sputtering process utilizes an RF magnetron.

16. A method of continuously coating a substrate with a buffer layer as a support for a ceramic superconducting material comprising

providing a feed spool of substrate;

threading the substrate into a vacuum deposition chamber;

loading at least one coating material that is to be coated onto the surface of the substrate into the vacuum deposition chamber;

reducing the pressure in the deposition chamber to no greater than about 10^{-5} Torr,

injecting oxygen into the deposition chamber;

initializing an energy source located in the deposition chamber to a pre-determined power level and trajectory;

vaporizing the coating material by bombarding the coating material with electrons or ions produced by the energy source;

feeding the substrate through a deposition zone in the vacuum chamber;

allowing the coating vaporized material to impinge upon the surface of the substrate in the deposition zone;

wrapping the substrate exiting the deposition zone helically around a cooling block such that the substrate traverses the deposition zone multiple times allowing the vaporized coating material to impinge upon the surface of the substrate for a period of time sufficient to deposit a coating onto the substrate; and

collecting the coated substrate on a take-up spool.

17. The method of claim 16 where the feed and take up spools are located external to the deposition chamber.

18. A method of continuously coating a substrate with a buffer layer as a support for a ceramic superconducting material comprising

providing a feed spool of substrate;

threading the substrate into a vacuum deposition chamber;

loading at least one coating material that is to be coated onto the surface of the substrate into the vacuum deposition chamber;

reducing the pressure in the deposition chamber to no greater than about 10^{-5} Torr,

injecting oxygen into the deposition chamber;

initializing an energy source located in the deposition chamber to a pre-determined power level and trajectory;

vaporizing the coating material by bombarding the coating material with electrons or ions produced by the energy source;

feeding the substrate through a deposition zone in the vacuum chamber;

allowing the coating vaporized material to impinge upon the surface of the substrate in the deposition zone;

wrapping the substrate exiting the deposition zone helically around a cooling block such that the substrate traverses the deposition zone multiple times allowing the vaporized coating material to impinge upon the surface of the substrate for a period of time sufficient to deposit a coating onto the substrate; and

feeding the coated substrate exiting the first deposition chamber to a second vacuum deposition chamber, which is dynamically isolated from the first deposition chamber.

19. The method of claim 18 where the coated tape exiting the deposition chamber is fed to a second deposition chamber via a Tee-tube.

20. The method of claim 18 where the tee tube is between about 6 and about 12 inches long and has a diameter just sufficient to accommodate the substrate.

21. The method of claim 18 where the substrate resides in the deposition zone of the first deposition chamber for a period of time different than the time it resides in the deposition zone of the second deposition chamber.

22. The method of claim 18 where the first vacuum deposition chamber comprises one deposition zone and also comprises a coating modification zone.

23. The method of claim 18 where there the substrate is a metal substrate and the coating is an epitaxially deposited buffer layer for a high temperature superconducting material

24. The method of claim 18 where the second deposition chamber contains a deposition zone where a coating is applied to the substrate by a sputtering process.

25. The method of claim 24 where the length of the sputtering deposition zone is controlled by a variable shutter.

26. The method of claim 24 where the sputtering process utilizes an RF magnetron.

27. The method of claim 18 where the first deposition chamber comprises two physically separate deposition zones and where the substrate alternately traverses each deposition zone.

28. The method of claim 27 where a different coating is deposited in each deposition zone.

29. The method of claim 27 where the same coating is deposited in each deposition zone.

30. The method of claim 27 where a different coating is applied in each of the deposition zones.

31. The method of claim 27 where a different process is used in each of the deposition zones.

32. A method of continuously coating a substrate with a buffer layer as a support for a ceramic superconducting material comprising

loading the substrate onto a feed spool,

feeding the substrate through an vacuum deposition chamber wherein a layer of a coating is applied to the substrate in a deposition zone and the coating is modified by treatment in a coating modification zone where the substrate is helically wound around a

cooling block and the deposition zone and coating modification zone are located on opposite sides of the cooling block and

loading the coated substrate onto a take-up spool.